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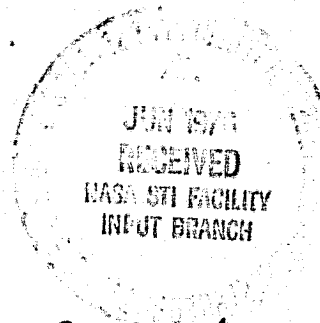
CONTINUATION OF ADVANCED CREW PROCEDURES DEVELOPMENT TECHNIQUES

DESIGN NOTE NO. 17

PPP EFFECTIVENESS STUDY

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1.0 SUMMARY

This design note presents a study of the Procedures and Performance Program (PPP) effectiveness. The intent of the study is to determine manpower time savings and the improvements in job performance gained through PPP automated techniques. The discussion presents a synopsis of PPP capabilities and identifies potential users and associated applications, PPP effectiveness, and PPP applications to other simulation/training facilities. Appendix A provides a detailed description of each PPP capability.

2.0 INTRODUCTION

The PPP is an automated procedures recording and crew/vehicle performance monitoring system. The heart of the system is an interactive digital computer program which translates inputs from a man-in-loop simulator into crew procedures and performance data outputs. The procedures data may be compared with a stored reference, thus providing a difference procedures capability. Performance data may be displayed either alphanumerically or graphically and may be compared to a set of established criterion, thus providing a performance evaluation capability. Both procedures and performance data are available on CRT displays during real-time operations and on CRT displays and hardcopy outputs post-run. The data may also be transferred to the Generalized Document Processor (GDP) for formal documentation.

The Continuation of Advanced Crew Procedures Development Techniques (CACPDT), Statement of Work (SOW) included a task to study the effectiveness of these PPP automated techniques. Since the program has only provided operation support to one Shuttle Procedures Simulator (SPS) simulation, the Systems Management 2 (SM2) simulation, much of the study is a subjective analysis. Examples of SM2 output data are illustrated in Reference 1. This data was used to some extent to verify SM2 procedural activity and vehicle response. This

usage provides some substantiation of the analysis presented in this design note.

3.0 DISCUSSION

This design note presents a study of the Procedures and Performance Program (PPP) effectiveness. The following paragraphs describe PPP capabilities, and identify potential users and associated applications, PPP effectiveness when applied to procedures development, mission analysis, training and simulator support activities, and possible applications to other simulator/training facilities.

3.1 Synopsis of Capabilities

PPP Overview - The PPP is an automated procedures recording and crew/vehicle performance monitoring system presently operating in conjunction with the SPS. The system translates SPS crew station inputs and program data into crew procedures and crew/vehicle performance data outputs. These outputs support the procedures development and verification, systems analysis, mission analysis, flight planning, and crew training tasks for Shuttle flight operations by providing (1) an automated means of developing/recording crew procedures based on crew simulator activities, (2) an automated means of comparing actual (present run) versus reference (past run/verified) procedures during a training session, (3) a permanent record of crew/vehicle performance data during a run, (4) an automated means of evaluating critical performance parameters, (5) an automated means of developing training scripts by recording instructor action, (6) an automated means of tracking training status data resulting from all training sessions, (7) a means of transferring the data to the Generalized Document Processor (GDP) for formal documentation and distribution, and (8) an automated

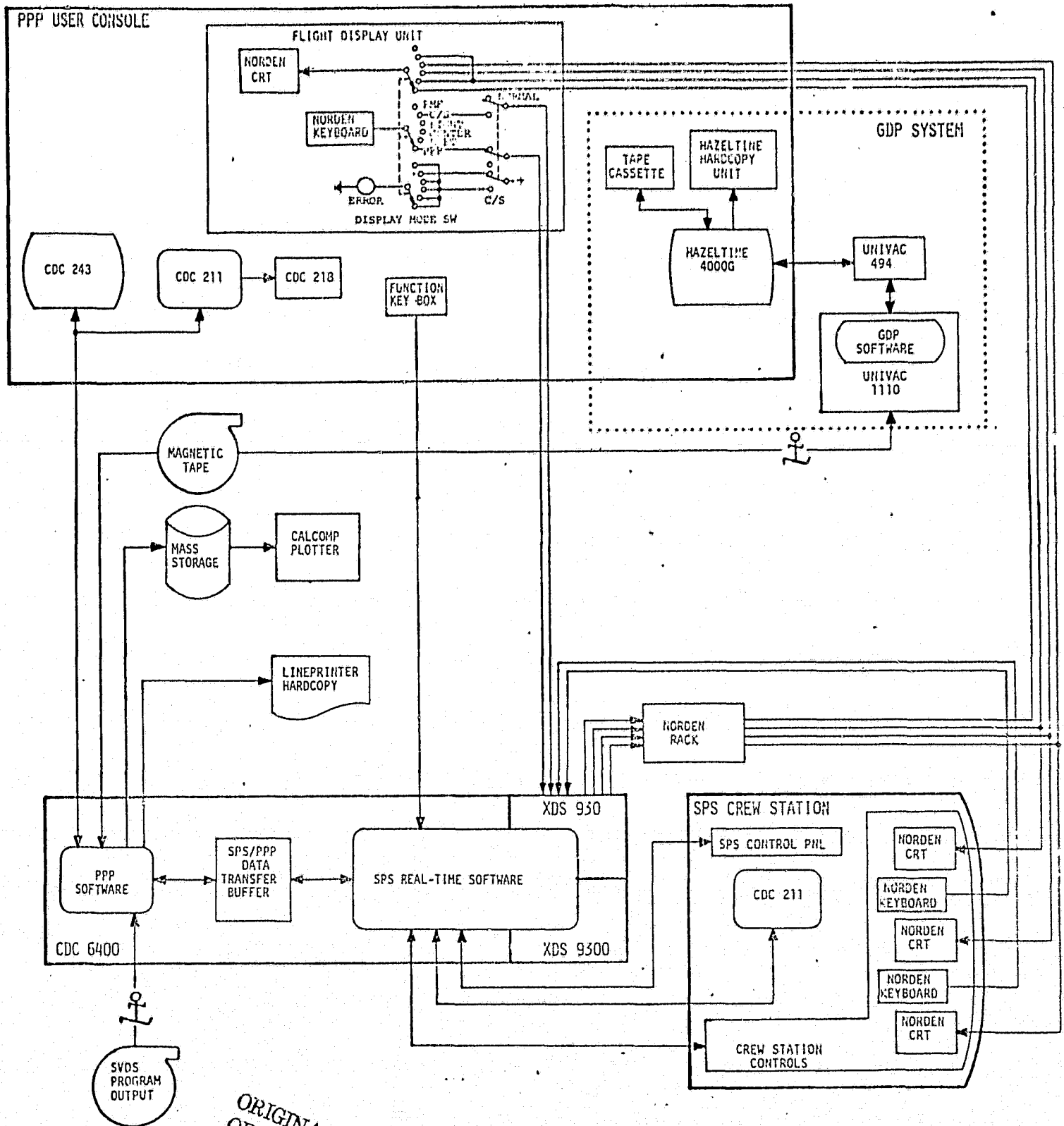
means of generating preliminary procedures data for planning simulator usage and establishing initial procedures timelines' from the Space Vehicle Dynamic Simulation (SVDS) program.

The PPP utilizes either a CDC 211 or CDC 243 terminal as the user interface device for program control and data monitoring. The CDC 211 displays alphanumeric procedures and performance data formats and the CDC 243, graphical performance data formats. Figure 1 presents the PPP hardware and program interfaces with the SPS, GDP, and SVDS systems. During a simulation run, procedures and performance data formats are available in real-time on the CDC 211 or CDC 243 terminals. During simulation holds or post-run, the data may be reconstructed at any point in past time. During post-run operations, procedures, performance, and training data formats are available on either terminal, on hardcopy outputs, and/or on magnetic tape for transfer to the GDP for formal documentation and distribution. Reference 2 describes the detailed operations required to use the PPP and details of the data outputs available.

PPP Capabilities Summary - The PPP provides the user with procedures, performance, and training data outputs. Each individual display format is user definable. This allows different users to construct formats applicable to their unique requirements within the limits of the available data. The following paragraphs provide a general description of these display formats and other PPP capabilities. Appendix A presents a detailed description of each.

Procedures formats provide time tagged data specifying major Shuttle mission events (e.g., MECO or Entry Interface), crew station input

FIGURE 1
PPP HARDWARE AND PROGRAM INTERFACES



device activities (e.g., switches or hand controllers), crew station output responses (e.g., status lights or talkbacks), trajectory related data (e.g., station coverage or day/night status), and simulation malfunction status.

Difference procedures formats provide a unique method of data presentation and analysis. This capability allows the user to automatically compare actual simulator status and crew procedures, during real-time operations, against previously stored reference data. The reference data is generated from previous simulations and may have been edited on the GDP system. Difference procedures present time tagged data that verifies proper crew station status for the simulation initial configuration, simulation holds, and real-time run operations, and verifies user specified procedural and event sequences. The system flashes a message to the user when a difference is detected and a listing of these differences is provided for easy tracking.

Performance data formats provide alphanumeric and/or graphical outputs of simulator parameters transferred to the PPP. The system allows the user to define formats using any of the parameters transferred. Formats can contain parameters associated with trajectory data, a particular vehicle system, mission phase data, or any combination the user desires. The data outputs present the current simulation time value of the parameters displayed.

Performance evaluation formats provide an automated method of data analysis. This capability allows the user to compare selected crew/vehicle performance parameters against a set of established criterion data. When the criterion data is exceeded, the deviations are output

to the user. Formats can be established for any user defined phase of the Shuttle mission and when the criterion defining that phase has been satisfied, the system automatically advances to the next phase's format.

PPP training data provides two types of data. The first is script data which is a time sequence listing of the operator's PPP Users Console and simulator control console input activities. This data initially may be used to generate formal training script documentation. Subsequently, the data may be used to verify proper operator actions if a problem or question arises during a training session. The second type of data tracks the status of simulator training activities. These formats include crew status by crewman, exercise and time, noncrew status (training personnel activities), and total hours of system utilization.

Other PPP capabilities include data reconstruction, GDP transfers, SVDS transfers, and a flight display unit for monitoring crew station displays. Reconstruction allows a user to access past time data during simulation holds and post-run. A cue function is provided to assist in accessing the data. GDP transfers allow the user to put PPP data on the GDP system; then to edit, finalize, and document the data. The finalized GDP procedures data may then be transferred back to the PPP as reference data. SVDS transfers allow the user to generate the initial procedures timeline for any trajectory from SVDS program outputs. The flight display unit allows the user to access the same flight displays that are displayed on the crew station CRT's.

3.2 Potential Users and Applications

Identification of Potential Users

PPP real-time and post-run output capabilities can supply useful data to various Shuttle program disciplines. The first potential user identified was the flight operations discipline. In this area, PPP data can support systems analysis, mission analysis, procedures development, flight planning, and training activities. Other potential users subsequently identified include Engineering and Development (E&D), Data Systems and Analysis (DSA), and simulator support disciplines. In these areas, PPP data can support systems analysis, mission analysis, and simulator checkout and verification.

Application of PPP to User Needs

Figure 2 presents a detail matrix relating PPP capabilities to two different potential users needs. The first grouping indicates user needs for the flight operations, flight procedures development process as defined in Reference 3. The matrix shows the PPP capabilities applicable to supporting user needs for each task identified. In general, total PPP capabilities are utilized during simulation activities. Other tasks are supported by the data output gathered during these simulation activities. Similar applications exist for the E&D (data outputs were supplied for the E&D Systems Management 1 & 2 Simulations) and DSA disciplines, but a detailed identification has not been performed to date. The second grouping identifies user needs for the simulator support discipline, and also indicates the different PPP capabilities supporting each task.

The following discussions provide detailed operational flows for three of the identified users.

FIGURE 2
APPLICATION OF PPP TO USER NEEDS

		PROCEDURES AND PERFORMANCE PROGRAM CAPABILITIES																					
		PERFORMANCE DATA		PERFORMANCE EVALUATION		DIFFERENCE		PROCEDURES				TRAINING DATA						GCP TRANSFER		SVES TRANSFER			
		ALPHANUMERIC DISPLAYS	GRAPHICAL DISPLAYS	ALPHANUMERIC DISPLAYS	GRAPHICAL DISPLAYS	INITIAL STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	NO. DIFFERENCES	STATUS CHECK	
FLIGHT PROCEDURES DEVELOPMENT TASKS	CREW OPERATIONAL REQUIREMENTS																						
	• HARDWARE/SOFTWARE/MISSION REQUIREMENTS																						
	• DOCUMENT/DESIGN REVIEW																						
	• PANEL MEETINGS																						
	• ENGINEERING SIMULATIONS																						
	• CREW ACTIVITY TIMELINES																						
	FLIGHT PROCEDURES/TECHNIQUES DEVELOPMENT																						
	• FLIGHT TECHNIQUES PANEL INTERFACE																						
	• PART TASK SIMULATIONS																						
	• ANALYTICAL STUDIES																						
• CREW ACTIVITY TIMELINES UPDATES																							
DETAILED PROCEDURES DEVELOPMENT/VALIDATION																							
• BASELINE VEHICLE DESIGN																							
• FLIGHT TRAJECTORY DESIGN																							
• PART-TASK SIMULATIONS																							
• PROCEDURES CONSTRAINTS/RATIONALE																							
• DETAILED PROCEDURES																							
• TRAINING CHECKLISTS																							
• FLIGHT PROCEDURES HANDBOOK																							
PDF DEVELOPMENT/VALIDATION																							
• PRELIMINARY PDF																							
• PART-TASK SIMULATIONS																							
• CONDITIONAL VALIDATION																							
• BASIC PDF																							
• CPB CONTROL																							
• FLIGHT SIMULATIONS																							
• BASIC EDITION VALIDATION																							
• FINAL PDF																							
• INTEGRATED SIMULATIONS																							
• FLIGHT READINGS VALIDATION																							
CREW TRAINING/FLIGHT OPERATIONS SUPPORT																							
• BRIEFINGS/PART-TASK/FAMILIARIZATION																							
• BASIC/FLIGHT RELATED																							
• INTEGRATED																							
• REAL TIME SUPPORT																							
• DEBRIEFINGS																							
SIMULATOR SUPPORT OPERATIONS	PREFLIGHT CHECKOUT AND TESTING																						
	• INITIAL STATUS CHECK																						
	• POWER-UP SEQUENCE																						
	• CONFIGURE FOR CHECKOUT																						
	• STATIC AND DYNAMIC CHECKOUT																						
	NOTIFICATION OF AVAILABILITY AND STATUS																						
	CONFIGURE FOR UNUSUALLY PLANNED EXERCISE																						
	ASSIST IN FINAL PREPARATION																						
	INFLIGHT OPERATIONS																						
	• INFLIGHT DISPLAYS AND EQUIPMENT																						
• ASSIST IN PLANNED TRAINING EXERCISE																							
POST-FLIGHT OPERATIONS																							
• COORDINATE RECONFIGURATION ACTIVITIES																							

* This capability has not been implemented.

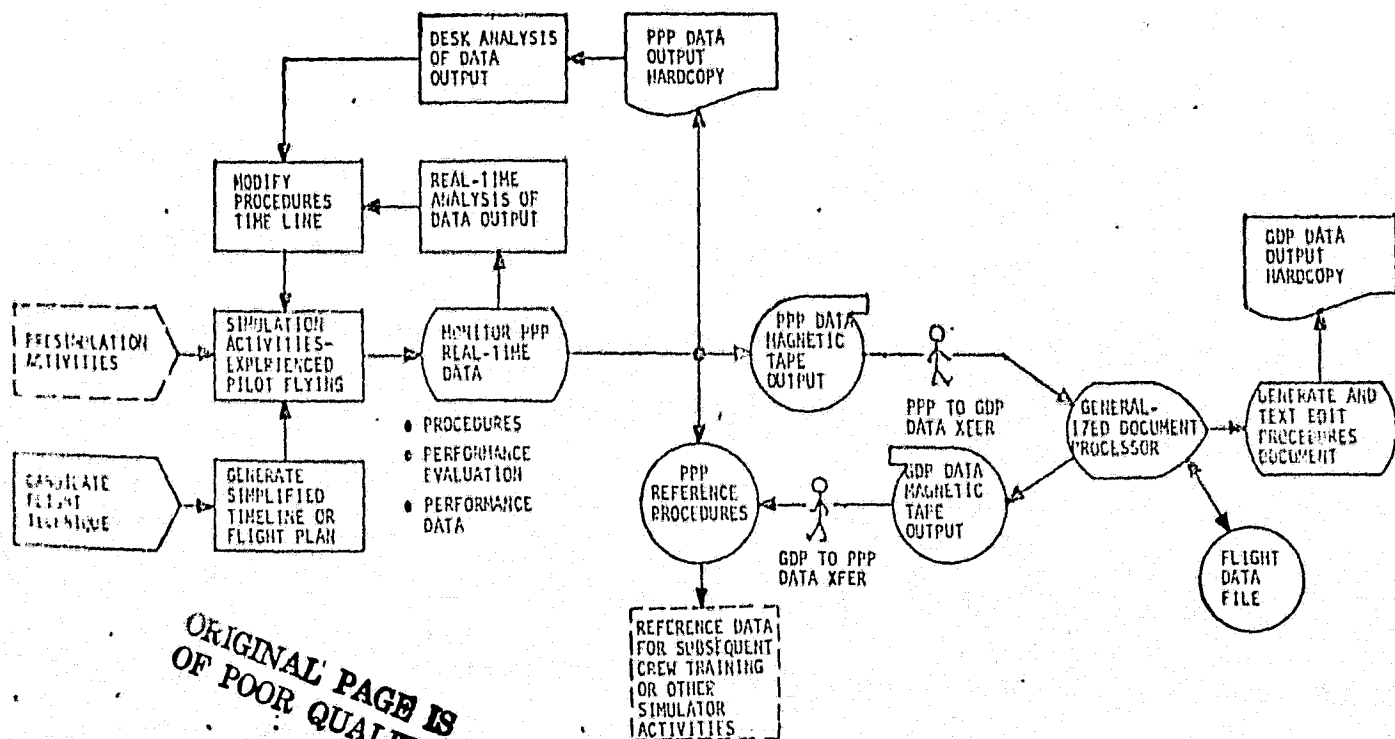
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PPP Procedures Development Operational Flow

PPP real-time and post-run outputs can be utilized to aid the flight techniques and procedures development task. Figure 3 presents an operational flow for this activity. Using an abbreviated timeline or simplified flight plan, the candidate technique can be flown in a simulator by an experienced pilot. During the real-time simulation, monitoring PPP real-time data allows the developer to check procedural steps against performance data responses. This real-time output provides for immediate procedural modifications when required. Following the simulation exercise, hardcopy outputs are available for subsequent

FIGURE 3

PROCEDURES DEVELOPMENT OPERATIONAL FLOW



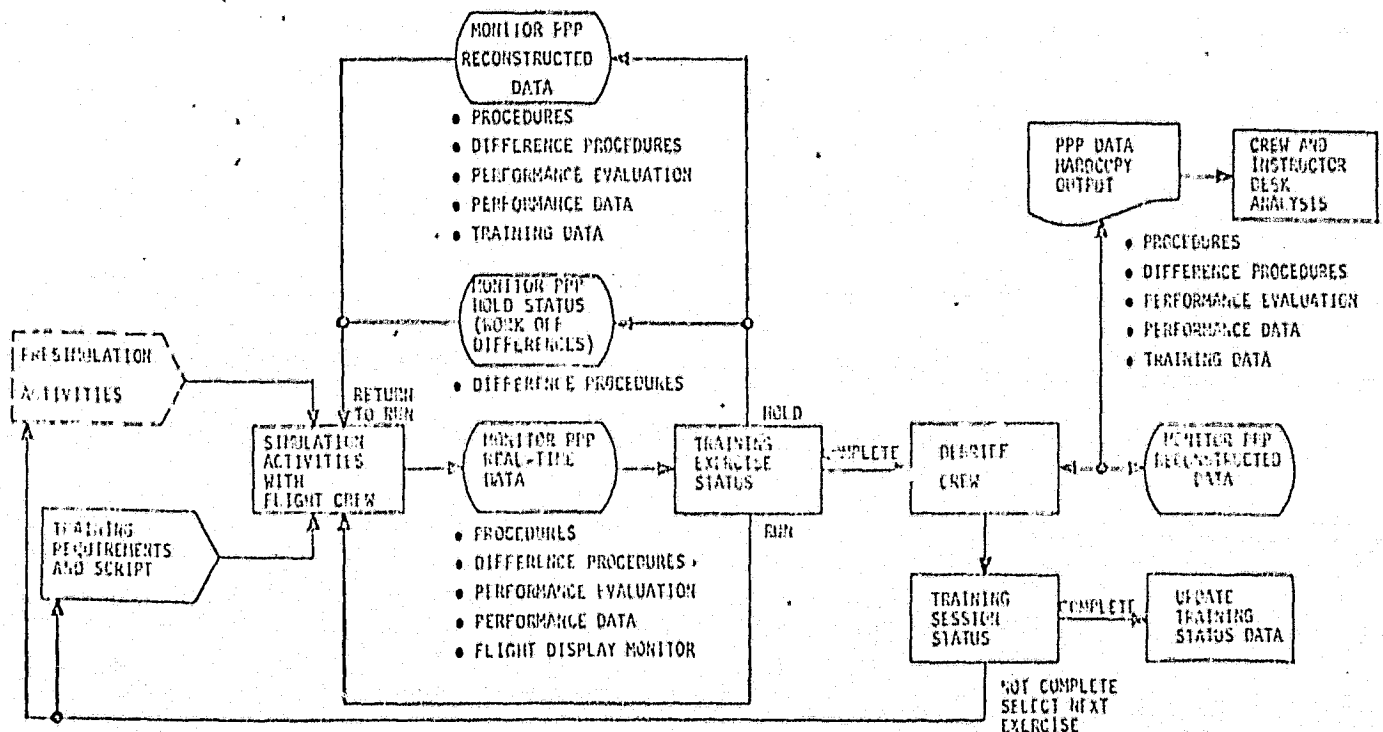
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analysis and modifications, and magnetic tape outputs are available for transfer to the GDP, thus generating the initial procedures documentation. GDP text edit capabilities provide the capability to finalize the procedures for FDF documentation. The finalized FDF data may then be transferred back to the simulator as reference procedures data.

PPP Crew Training Operational Flow

Figure 4 presents the PPP operational flow for crew training activities. Training instructors, prior to simulation activities, may automatically verify the initial crew station configuration for a training exercise. During the exercise, crew station procedures and vehicle responses are

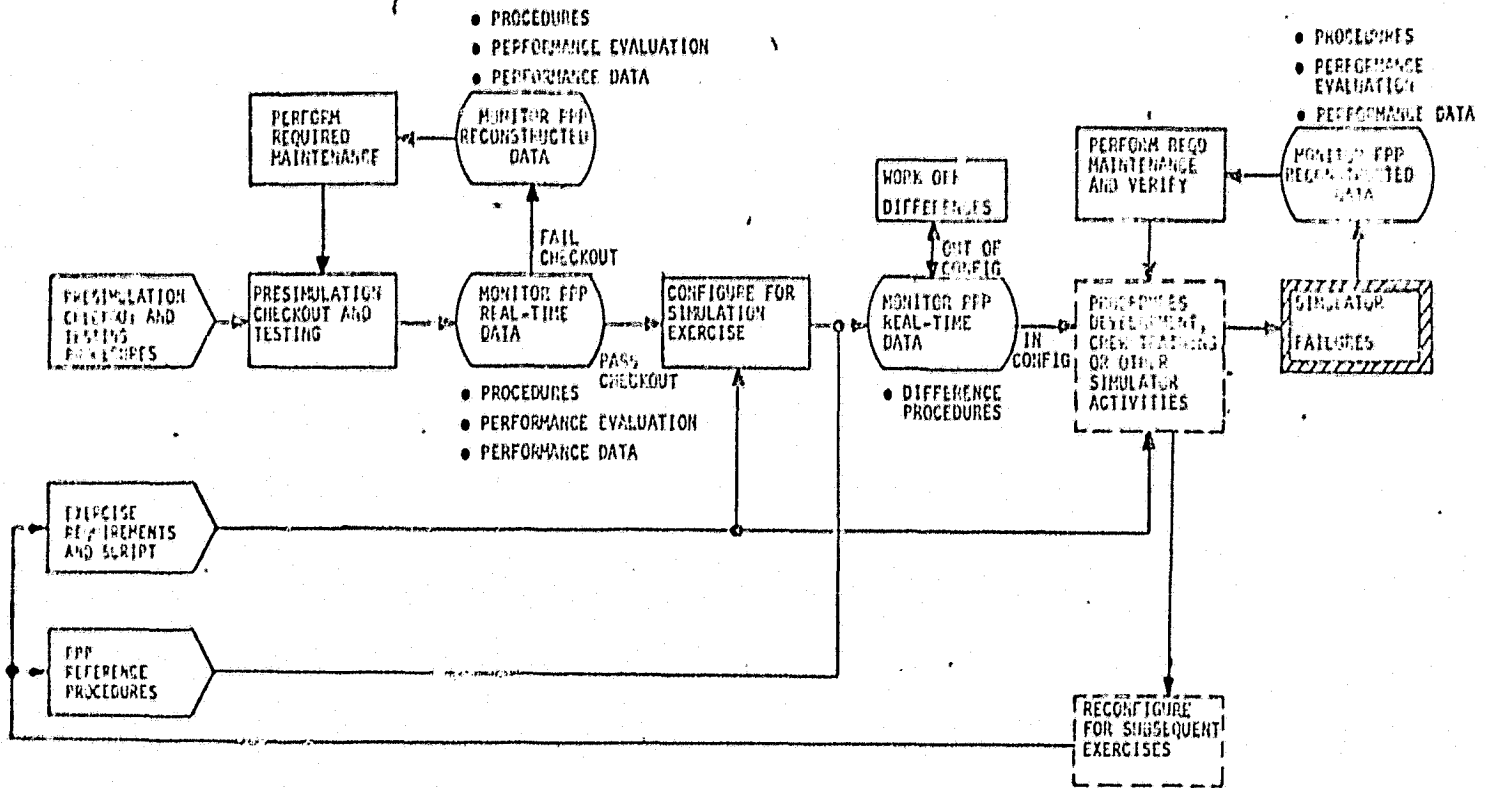
FIGURE 4
CREW TRAINING OPERATIONAL FLOW



available. Included in the procedures data are malfunction status indications which allow the training instructor indications of crew responsiveness to these malfunctions. Comparisons of the procedures data may be made against the established reference procedures data. These comparisons provide the instructor a quick check on how closely the crew is following the reference procedures. Performance evaluation data provides another check of the quality of the run by comparing selected parameters against the preestablished criterion data and displaying any deviations. Also, any simulator parameter transferred to the PPP can be monitored if desired. Finally, the Flight Display Monitor allows the instructor to monitor the crew station CRT displays. When the instructor or trainee feels a simulation hold is required to discuss the past activities, the instructor has the capability to reconstruct the past time data and immediately answer any question with substantiating data. The system also automatically tracks the crew station status, during a simulation hold, and notifies the instructor of any configuration changes. Following completion of the exercise, the system provides for immediate display of the reconstructed data to support the crew debriefing. Hardcopy outputs are also available for subsequent review and discussion.

PPP Simulation Support Operational Flow

PPP output capabilities are attractive in the area of simulation support. The outputs which provide automated analysis, can speed-up the checkout and testing activities while increasing accuracy. Figure 5 presents the operational flow for the simulation support activity. During the presimulation activities, PPP real-time outputs are monitored to verify the simulator is operating within specified tolerances. If

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SIMULATION SUPPORT OPERATIONAL FLOW

the specified tolerances are exceeded, PPP data reconstruction provides a time data history to aid in the problem's solution. After completing checkout, the initial configuration difference capability is employed to aid in the establishment of proper crew station configuration. This capability is also employed post-exercise to aid in configuring for subsequent exercise. If a simulator failure occurs during simulation activities, post-exercise reconstruction capabilities provide the same time data history to aid in troubleshooting the failure. The data in this case allows support personnel to duplicate operations prior to the failure when verifying the maintenance performed.

3.3 PPP Effectiveness

PPP output capabilities provide a useful and effective tool when applied to the user needs and tasks previously discussed. Proper use of this tool can save users time in completing their tasks and supply a combination of data that will improve total job performance. Time savings are a direct result of automated techniques applied to time consuming tasks such as crew station configuration/verification, procedures documentation, performance data analysis, and training status documentation. The improvements in job performance result from properly identified and well formatted data outputs and from time savings which reduce required manpower.

The effectiveness of PPP capabilities is presented in Figure-6. The figure presents a list of PPP capabilities, specifies that capability's function and provisions, indicates any previous methods employed, and then identifies the effectiveness of the capability. The list only provides the effectiveness on an individual capability basis and thus does not provide a total picture of overall PPP effectiveness. Coupling various capabilities further increases PPP effectiveness. This can readily be seen in the case of procedures development, crew training, and simulator support activities.

Considering procedures development, the obvious PPP aid is the procedures recording capability. This capability ensures recording of all crew station procedural operations on a user defined format. This output alone reduces the required typing support, subsequent review time, and correction cycle. By coupling procedures recording with difference procedures, performance data, and performance evaluation data (all time tagged), the iterative process of desk analysis work

FIGURE 6

EFFECTIVENESS OF PPP CAPABILITIES

CAPABILITY	FUNCTION AND PROVISIONS	PREVIOUS METHODS	EFFECTIVENESS
Procedures Data	<p>Automated recording and display of real-time simulation procedural operations and mission events.</p> <ul style="list-style-type: none"> Real-time recording and verification of potential procedures checklist. Procedures recorded using standard nomenclature from common data base. User definable formats provide flexibility to construct new or revised documentation to fit users needs. 	<ul style="list-style-type: none"> Manual tracking, recording, and markups of existing procedures. Tedious review of all procedures documentation. Not applicable. 	<ul style="list-style-type: none"> Precise well formatted documentation that eliminates manual errors. Precise documentation for trouble-shooting simulator failures. Eliminates nomenclature errors and saves many man-hours. System handles new or revised formats without software changes.
Performance Data	<p>Display of simulator performance data.</p> <ul style="list-style-type: none"> User definable formats allow grouping of systems or mission related parameters on one display page (graphical or alphanumeric). Post-run selection of only the required data. 	<ul style="list-style-type: none"> Search of onboard displays with a limited parameter hardcopy during real-time. Post-run search of large volume of hardcopy outputs including unwanted data. 	<ul style="list-style-type: none"> Improves data access for analysis purposes. Reduces volume of unnecessary hardcopy data outputs.
Performance Evaluation Data	<p>Display of simulator performance data with automatic calculations of deviations from established criterion.</p> <ul style="list-style-type: none"> User definable formats allow grouping of related critical parameters on one display page. Post-run selection of only the required data. Rapid recognition of out-of-tolerance conditions from display of calculated deviations. Snapshot calculations of desired parameters at mission critical times. Graphics provides unlimited number of traces providing the parameters past trends and including criterion plots. Scaling, labeling, parameter, and run identification automatically output with all data. 	<ul style="list-style-type: none"> Search of onboard displays with limited parameters hardcopy during real-time. Post-run search of large volume of hardcopy outputs including unwanted data. Recognition of out-of-tolerance conditions depend on user knowledge of limits and available cue card aids. Search of onboard displays at the mission critical times. Limited traces of X-Y plotter and time variant strip chart recorder outputs. Scaling, labeling, parameter, and run identification recorded manually. 	<ul style="list-style-type: none"> Improves data access for analysis purposes. Reduces volume of unnecessary hardcopy data outputs. Reduces chance of unproductive simulation runs and negative training. Ensures access of critical data. Improves data access for analysis purposes. Eliminates manual identification of data. Run identification reduces chance of data loss or mix up.
Difference Procedures Data	<p>Automatic comparison of present run procedures and simulator status against an established reference during real-time and post-run.</p> <ul style="list-style-type: none"> Rapid and accurate verification of initial crew station status (only out of configuration devices displayed). Tracking of crew station configuration during simulation holds. Rapid check of crew station configuration at random user specified times. Rapid check of crew station configuration at preestablished (critical), user specified times. Rapid check of procedural sequences during critical mission phases. Provides a listing of all detected differences. 	<ul style="list-style-type: none"> Switch by switch visual verification of total crew station configuration. None other than manual verification if the initial hold configuration is known. None. Manual monitoring of crew procedures against checklist in real-time. None. 	<ul style="list-style-type: none"> Man-hours and errors reduced in establishing initial crew station configuration. Reduces errors resulting from configuration changes during simulation holds. Ensures simulation exercise is proceeding per the established reference. Ensures simulation exercise is proceeding per the established reference. Immediate notification of erroneous operations reduces negative training. Saves man-hours by reducing reruns of an exercise. Ensures discussion and debriefing of all problem areas. Reduce man-hours finding and researching problem areas.
Training Data	<p>Automatic recording of simulator operators inputs (script) and simulator activities (status).</p> <ul style="list-style-type: none"> Records operators control inputs to the simulator and PPP. Records and accumulates exercises executed for crew training, noncrew activities, and total simulator/PPP utilization. 	<ul style="list-style-type: none"> Not applicable. Manual recording and accumulation including post-mission guessing. 	<ul style="list-style-type: none"> Provides for verification of proper execution of exercise training script. Increases accuracy of records and reduces man-hours required to assemble the data. Formatted output can be used directly for required documents.
Data Reconstruction	<p>Access for past-time procedures and performance data.</p> <ul style="list-style-type: none"> CRT outputs during simulation holds. CRT outputs post-run for subsequent review and debriefing. 	<ul style="list-style-type: none"> None. Hardcopy outputs. 	<ul style="list-style-type: none"> Aids in discussions of reviews of questionable portions of an exercise. Immediate access to data reducing wasted man-hours waiting for debriefing data. CRT review can reduce the required hardcopy outputs.
Cue Insertion	<p>Allows user to automatically record times, during simulation real-time, to be used for subsequent data access.</p> <ul style="list-style-type: none"> Time tags problem areas or desirable discussion areas of any simulation without requiring a simulation hold (reconstruction and cue table provide access at a later time). 	<ul style="list-style-type: none"> Manual recording of problem areas and subsequent search through hardcopy outputs for desired data or going to simulation hold. 	<ul style="list-style-type: none"> Quick and simple identification of questionable areas for later discussion. Reduce simulation holds for minor problems.
PPP/GDP Data Transfer	<p>Provides for direct PPP/GDP data transfers via magnetic tape.</p> <ul style="list-style-type: none"> Transfer of all PPP simulation data to GDP. Transfer of GDP procedures data to PPP. 	<ul style="list-style-type: none"> Manual transfer of simulation data monitored. Not applicable. 	<ul style="list-style-type: none"> Reduces man-hours required to format data for formal documentation. Provides FDF reference procedures.
SDS Data Transfer	<p>Generates Shuttle trajectory, performance data file for any mission phase.</p> <ul style="list-style-type: none"> Provide initial procedures timeline definition including trajectory data. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Reduces manual operations.
Flight Display Unit	<p>Provides simulator operator easy access to crew station flight displays.</p> <ul style="list-style-type: none"> Allows tracking of CRT data displayed to crewmen. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Addition data check on crews flight display selection and response to the displayed data.

and simulator reverification of developed procedures is shortened. These same PPP capabilities support new techniques evaluation. In this case, real-time PPP outputs provide extensive on-the-spot evaluations; and post-run outputs provide the initial properly formatted procedures and the data necessary to reduce the iterative processes.

In the case of crew training activities, PPP outputs supply a set of data that can increase the training quality. From start to finish of a training exercise, PPP data aids the training instructor in ensuring proper exercise execution. Prior to an exercise, difference procedures allow the instructor to quickly eliminate initial crew station configuration errors; then through preestablished and random comparisons, proper configuration may be checked during the run. Also, during a run, sequence difference capabilities provide an automatic check on pre-defined sequential operations. Since all data is time tagged, the effects of any detected difference can be quickly determined by accessing the appropriate performance and performance evaluation data displays. Malfunction indications in the procedures data allow the instructor to track malfunction insertion, vehicle response to the malfunction and crew reaction to these vehicle responses. Together this data aids the instructor in evaluating the quality of an exercise. The trends noted through the data can lead the instructor to place the simulator in hold to discuss potential problems, reestablish proper configuration or even terminate an exercise if it does not appear constructive. After exercise completion, the data provides a broad base for crew debriefings and exercise evaluation. Access of the data is easy and rapid using PPP data reconstruction, and therefore, reduces wasted time waiting for data outputs. In total, this data provides a positive training atmosphere and wasted runs and negative training can be held to a minimum.

Finally, PPP data can aid simulator support personnel in the performance of simulator verification and maintenance operations. Procedures data provides a record of crew station input/output discrete interaction, including reaction time. This data coupled with performance data provides an indication of crew station input and vehicle dynamic characteristics interaction. The total data output provides vital documentation for simulator hardware and software verification. These same outputs provide firm documentation for analyzing simulator malfunctions, and reduce the verbal communication required between simulator user and maintenance personnel. Detailed documentation then allows maintenance personnel to easily duplicate simulator malfunctions and duplicate procedural steps leading to the malfunction during maintenance verification.

In summary, the PPP can effectively produce manpower savings and improve job performance. In the areas of procedures development, crew training and simulator support activities, the PPP can improve simulator utilization by removing guess work and reducing the need to rerun simulation exercises.

3.4 Technology Applications to Other Simulator/Training Facilities

Typically, a man-in-loop simulator is developed to fulfill all or part of the following functions: (1) evaluation and improvement of a complex systems design, (2) development and refinement of the systems operational procedures, and (3) training operators to control the system and react to its response characteristics (often in real-time). Fulfillment of any of the functions is supported through the acquisition and analysis of pertinent data. Often simulator/training facilities apply manual methods to monitor, record, and analyze data using post-run lineprinter outputs. Then pertinent data, often contained in a large volume of

columnar outputs is extracted, interpreted, plotted, and analyzed. These manual methods are tedious, prone to error, and time consuming.

The application of existing PPP automated technology to any man-in-loop simulation can reduce time consuming manual operations. This includes aerospace, military, and commercial facilities. In the aerospace field, requirements for the PPP capabilities have been established for the fixed and motion base Shuttle Mission Simulator (SMS) and the Phase II SPS. Although no requirements have been established in the other areas, similarity of simulation complexes, simulator activities, and training requirements indicate applications to military and commercial aircraft, marine, and other complex vehicle simulators. Finally possibilities may exist for industrial complex simulations such as refineries, chemical plants, and nuclear power plants.

4.0 CONCLUSIONS/RECOMMENDATIONS

Automated PPP capabilities provide an effective tool in support of man-in-loop simulation activities. The capabilities can reduce manpower required and improve total job performance especially for the potential users previously identified.

Since PPP capabilities can be effective and have application for future man-in-loop simulators, it is recommended that:

- (1) Development of new and refinement of existing PPP capabilities continue.
- (2) PPP capabilities be utilized when possible for the remaining SPS Phase I simulations.
- (3) PPP capabilities be implemented for all SPS Phase II simulations.
- (4) PPP capabilities be implemented for SMS fixed and motion base simulations.

5.0 REFERENCES

1. JSC-10941, JSC Internal Note, Simulation Report Systems Management Simulations Systems Management 2 & 3, dated March 1976, Engineering Simulations Branch, ASED.
2. McDonnell Douglas Report, MDC W1009, Advanced Crew Procedures Development Techniques, Procedures and Performance Program Users Guide, dated 29 August 1975.
3. JSC-09103, Flight Operations Directorate, Basic Space Shuttle Crew Procedures Development Plan, dated April 30, 1976, Training Development and Integration Branch, CTPD.

APPENDIX A

PPP CAPABILITIES DETAILED DESCRIPTION

A.1 PPP CAPABILITIES DETAILED DESCRIPTION

Figures A1 through A19 present detail descriptions of the various PPP capabilities. Each figure provides a summary description of the capability, the typical simulator control console and PPP user console operations, and the available PPP displays and their content.

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FIGURE A1

PPP PROCEDURES RECORDING CAPABILITY		FORMAT: FMT2xx																																																	
SUMMARY DESCRIPTION	THE PROCEDURES RECORDING CAPABILITY PROVIDES A TIME HISTORY OF THE OPERATIONS PERFORMED IN THE SIMULATOR CREW STATION AND MISSION EVENTS, OR A SUMMARY OF MISSION EVENTS. PROCEDURES DATA DISPLAYS ALLOW FOR THE PRESENTATION OF DATA RELATIVE TO THE PRESENT RUN AND THE REFERENCE RUN. THE CONTENT AND FORMAT OF THE PROCEDURES DATA DISPLAYS ARE USER DEFINABLE.																																																		
	SIMULATOR OPERATIONS	PPP OPERATIONS																																																	
TYPICAL SIMULATOR/PPP OPERATIONS	INITIALIZE SIMULATOR	INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN	PPP TO RUN MODE																																																
	SIMULATOR TO RUN MODE	MONITOR PROCEDURES DATA DISPLAY I,REPEAT=GET,0/00/00	MONITOR PROCEDURES FORMAT AT RECONSTRUCTION TIME REQUEST DIFFERENT PROCE- DURES FORMAT. TIME EQUALS RECONSTRUCTION TIME OBSERVE AUTOMATIC RESYNCH- RONIZATION AND CONTINUA- TION OF DATA DISPLAY AT CURRENT TIME TERMINATE PPP REAL TIME OPERATIONS																																																
	SIMULATOR TO HOLD MODE	I,DISPLAY=2,1,1																																																	
	SIMULATOR TO RUN MODE	I,ENDRT																																																	
	SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION	I,DISPLAY=2,4,1 I,REPEAT=GET,0/05/00	REQUEST DIFFERENT PROCE- DURES FORMAT RECONSTRUCT PROCEDURES DATA DISPLAY STARTING AT 5 MINUTES ADVANCE DISPLAY 1 FULL PAGE																																																
	3) TERMINATE THIS RUN - RECONFIGURE FOR NEXT RUN	I,↑ I,TERMINATE	END PPP OPERATIONS																																																
AVAILABLE DISPLAY AND CONTENT	<table><tr><th colspan="2">FREEZE KEY</th><th>ACTUAL</th></tr><tr><th>SM SIMULATION DATA</th><th>RUN 09/19/75 FMT241</th><th></th></tr><tr><td>ELAPSED TIME</td><td>MALF IDENT</td><td>C/W ALERT, CRT DISPLAY AND SW/CB PROCEDURE PNL</td></tr><tr><td>0/00/43</td><td></td><td>SM ALERT LT-ON</td></tr><tr><td>0/01/10</td><td></td><td>CABIN TEMP CONT-OFF L2</td></tr><tr><td>0/01/15</td><td></td><td>CABIN FAN 1-ON L1</td></tr><tr><td>0/01/20</td><td></td><td>C/W CBN FLOW LT-OFF</td></tr><tr><td>0/01/30</td><td></td><td>✓ DISPLAY-0701-E C2L</td></tr><tr><td>0/01/31</td><td></td><td>20701-L</td></tr><tr><td>0/01/40</td><td></td><td>DISPLAY 0711 F C2R</td></tr><tr><td>0/01/41</td><td></td><td>20711-E</td></tr><tr><td>0/01/46</td><td></td><td>KEYBOARD SEL-LEFT C2</td></tr><tr><td>0/01/54</td><td></td><td>DISPLAY 0721 E C2L</td></tr><tr><td>0/01/55</td><td></td><td>20721-C</td></tr><tr><td>0/03/09</td><td></td><td>ACK C2L</td></tr><tr><td>0/03/10</td><td></td><td>SM ALERT LT-OFF</td></tr></table>		FREEZE KEY		ACTUAL	SM SIMULATION DATA	RUN 09/19/75 FMT241		ELAPSED TIME	MALF IDENT	C/W ALERT, CRT DISPLAY AND SW/CB PROCEDURE PNL	0/00/43		SM ALERT LT-ON	0/01/10		CABIN TEMP CONT-OFF L2	0/01/15		CABIN FAN 1-ON L1	0/01/20		C/W CBN FLOW LT-OFF	0/01/30		✓ DISPLAY-0701-E C2L	0/01/31		20701-L	0/01/40		DISPLAY 0711 F C2R	0/01/41		20711-E	0/01/46		KEYBOARD SEL-LEFT C2	0/01/54		DISPLAY 0721 E C2L	0/01/55		20721-C	0/03/09		ACK C2L	0/03/10		SM ALERT LT-OFF	USER REQUESTED DISPLAY OF C&W ALERT DATA IN THIS COLUMN
	FREEZE KEY		ACTUAL																																																
SM SIMULATION DATA	RUN 09/19/75 FMT241																																																		
ELAPSED TIME	MALF IDENT	C/W ALERT, CRT DISPLAY AND SW/CB PROCEDURE PNL																																																	
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<table><tr><td>0/03/26</td><td>MEACF1 1 A</td><td>↑</td></tr><tr><td></td><td>.T.</td><td></td></tr><tr><td>0/03/28</td><td>C/W CBN FLOW LT-ON</td><td></td></tr><tr><td>0/03/28</td><td>MASTER ALARM LT-ON</td><td></td></tr><tr><td>0/03/28</td><td>MASTER ALARM LT-ON</td><td></td></tr><tr><td>0/03/28</td><td>MASTER ALARM LT-ON</td><td></td></tr><tr><td>0/03/35</td><td>C/W BKUP C/W LT-ON</td><td></td></tr><tr><td>0/03/42</td><td>SM ALERT LT-ON</td><td></td></tr><tr><td>0/03/55</td><td>MEACF1 1 M</td><td>←</td></tr><tr><td></td><td>.F.</td><td></td></tr></table>		0/03/26	MEACF1 1 A	↑		.T.		0/03/28	C/W CBN FLOW LT-ON		0/03/28	MASTER ALARM LT-ON		0/03/28	MASTER ALARM LT-ON		0/03/28	MASTER ALARM LT-ON		0/03/35	C/W BKUP C/W LT-ON		0/03/42	SM ALERT LT-ON		0/03/55	MEACF1 1 M	←		.F.		USER REQUESTED DISPLAY OF SWITCH/CIRCUIT BREAKER PROCEDURES IN THIS COLUMN																			
0/03/26	MEACF1 1 A	↑																																																	
	.T.																																																		
0/03/28	C/W CBN FLOW LT-ON																																																		
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0/03/55	MEACF1 1 M	←																																																	
	.F.																																																		
TIME OF PROCEDURAL ACTIVITY IN HR/MIN/SEC (GET, GMT, PET, OR SRT)		USER REQUESTED CRT DISPLAY NUMBER UPDATES IN THIS COLUMN																																																	
		SWITCH PANEL LOCATION																																																	
		MALFUNCTION ACTIVATED																																																	
		MALFUNCTION DEACTIVATION																																																	

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FIGURE A2

SUMMARY DESCRIPTION		PPP INITIAL CONFIGURATION DIFFERENCE CAPABILITY		FORMAT: FMT311
TYPICAL SIMULATOR/PPP OPERATIONS		THE INITIAL CONFIGURATION DIFFERENCE CAPABILITY DISPLAYS THE DIFFERENCE BETWEEN THE SIMULATOR CREW STATION SWITCH STATUS AND THE STATUS WHICH EXISTS ON THE REFERENCE DATA FILE THE USER HAS SELECTED FOR THE REFERENCE CONFIGURATION. TO INITIATE THE CAPABILITY, THE USER MUST INITIATE THE COMMAND, ICOMPARE. IF ANY SIMULATOR SWITCH CONFIGURATION DOES NOT AGREE WITH THE REFERENCE, AN AUTOMATIC DISPLAY OF FMT311 AND A MESSAGE "INITIAL CONFIGURATION DIFFERENCE" WOULD RESULT.		
		SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
AVAILABLE DISPLAY AND CONTENT	<div> <p>INITIALIZE SIMULATOR COORDINATE WITH PPP</p> <p>SIMULATOR TO RUN MODE SIMULATOR TO HOLD MODE</p> <p>CONFIGURE CREW STATION SWITCHES TO STATUS OF REFERENCE SIMULATOR TO RUN MODE</p> <p>NOTE: BECAUSE OF A DESIGN CONSTRAINT, A STRICT ADHERENCE TO THE PROCEDURAL SEQUENCE IS REQUIRED TO ACTIVATE THIS CAPABILITY.</p> </div>	<div> <p>INITIALIZE PPP I,DISPLAY=1,2,1</p> <p>I,N I,ACCEPT</p> <p>I,RUN COORDINATE WITH SIMULATOR</p> <p>I,ICOMPARE</p> <p>RETURN TO DESIRED PPP DISPLAY AND MONITOR SIMULATOR RUN</p> </div>	<div> <p>ACCESS REFERENCE DATA SELECTION SELECT DESIRED REFERENCE</p> <p>PPP TO REAL TIME SIMULATOR TO REAL TIME</p> <p>REQUEST INITIAL SWITCH COMPARISON OBSERVE: 1) FLASHING MESSAGE "INITIAL CONFIGURATION DIFFERENCE EXISTS" 2) AUTOMATIC DISPLAY OF FMT 311 DIFFERENCES WILL BE RE- MOVED AS RECONFIGURATION OCCURS</p> </div>	<div> <p>FLASHING MESSAGE ON COMMAND LINE</p> <p>STATUS OF REFERENCE SWITCHES</p> <p>STATUS OF SIMULATOR SWITCHES</p> <p>TIME OF RUN (CONTAINS BIAS FOR GROUND ELAPSED TIME FROM SIMULATOR ELAPSED TIME)</p> </div>

FIGURE A5

PPP SEQUENCE DIFFERENCE CAPABILITY		FORMAT: FMT331	
THE SEQUENCE DIFFERENCE CAPABILITY COMPARES THE SEQUENCE OF CREW PROCEDURAL ACTIONS AND EVENTS WITH THE SEQUENCE IN THE SELECTED REFERENCE. THE COMPARISONS ARE AUTOMATICALLY INITIATED AND COMPARE A PREDEFINED SET OF SWITCHES AND EVENTS AT A PREESTABLISHED EVENT RELATED TIME. IF A SEQUENCE DIFFERENCE EXISTS AS A RESULT OF THE COMPARISON, THE FLASHING MESSAGE "SEQUENCE DIFFERENCE DETECTED" APPEARS ON THE COMMAND LINE.			
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
	INITIALIZE SIMULATOR SIMULATOR TO RUN MODE SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION 3) TERMINATE THIS RUN RECONFIGURE FOR NEXT RUN	INITIALIZE PPP I,DISPLAY=4,1,1 I,RUN MONITOR PPP DATA DISPLAY I,DISPLAY=3,3,1 I,ENDRT I,TERMINATE	INCLUDE REFERENCE SELECTION OR APPROPRIATE PROCEDURES FORMAT PPP TO RUN IF DIFFERENCE EXISTS AT PRE-ESTABLISHED TIME OBSERVE: FLASHING MESSAGE "SEQUENCE DIFFERENCE DETECTED" MONITOR DIFFERENCE AND TAKE APPROPRIATE ACTION TERMINATES PPP REAL-TIME OPERATIONS END PPP OPERATIONS
AVAILABLE DISPLAY AND CONTENT	<div>SEQUENCE DIFFERENCE DETECTED < ACTUAL SEQUENCE DIFFERENCE RCASE004N001CRLBPAAMIJDA HOLD 12/04/75 FMT331 COMPARISON START- .05G + 0/00 ACTUAL SEQUENCE PNL REF SEQUENCE PNL ADI RATE-10 F6 ADI RATE-10 F6 ADI RATE-5 F6 ADI RATE-5 F6 ADI ERROR-20 F6 ADI ERROR-20 F6 ADI ERROR-5 F6 ADI ERROR-5 F6 TRIM ROLL-L C3 TRIM ROLL-L C3 TRIM ROLL-R C3 TRIM ROLL-R C3 TRIM ROLL-R L2 TRIM ROLL-L L2 FDAI SEL-ARTF HORIZ L2 TRIM ROLL-R L2 FDAI SEL-HEAD L2 FDAI SEL-ARTF HORIZ L2 SPD BRK THRUST TKOVR C3 FDAI SEL-HEAD L2 PRI FCS-RESET F6 SPD BRK THRUST TKOVR C3 GET 0/17/22</div> <div>FLASHING MESSAGE COMPARISON START TIME (EVENT + DELTA TIME) SWITCH PANEL LOCATION REFERENCE PROCEDURES SEQUENCE FOR THE PREDEFINED SWITCHES ACTUAL GET OF COMPARISON ACTUAL PROCEDURES SEQUENCE FOR THE PREDEFINED SWITCHES</div>		

FIGURE A6

PPP SUMMARY PROCEDURES DIFFERENCE CAPABILITY		FORMAT: FMT341
SUMMARY DESCRIPTION	THE SUMMARY PROCEDURES DIFFERENCE CAPABILITY PROVIDES A COMPARISON OF THE ACTUAL AND SELECTED REFERENCE SUMMARY PROCEDURES. THE COMPARISON INDICATES THE ACTUAL AND REFERENCE RUN EVENTS ON THE ACTUAL RUNS TIME SCALE.	
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS	PPP OPERATIONS
	INITIALIZE SIMULATOR SIMULATOR TO RUN MODE SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION 3) TERMINATE THIS RUN RECONFIGURE FOR NEXT RUN	INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN MONITOR PPP DATA DISPLAY AND AT USER DISCRETION I,DISPLAY=3,4,1 I,DISPLAY=2,4,1 I,ENDRT I,DISPLAY=3,4,1 I,TERMINATE
		REMARKS INCLUDE REFERENCE SELECTION OR APPROPRIATE PERFORMANCE FORMAT PPP TO RUN MODE MONITOR SUMMARY PROCEDURES DIFFERENCE MONITOR REMAINDER OF RUN TERMINATE PPP REAL-TIME OPERATIONS MONITOR SUMMARY PROCEDURES DIFFERENCE END PPP OPERATIONS
AVAILABLE DISPLAY AND CONTENT	<p>SUMMARY PROCEDURES DIFFERENCE ACTUAL R000E002H001C000P000I0LM HOLD 12/03/74 FMT 341 GET ACT SUMMARY PROC REF SUMMARY PROC 0/00 ENTRY INTERFACE ENTRY INTERFACE - .05 G .05 G - 0/10 - EQUILBRM GLIDE PHASE EQUILBRM GLIDE PHASE - 0/20 - 0/30 TIME OF ACTUAL SUMMARY PROCEDURES EVENTS REFERENCE SUMMARY PROCEDURES ACTUAL SUMMARY PROCEDURES</p>	

FIGURE A7

SUMMARY DESCRIPTION		PPP DETAILED DIFFERENCE LISTING		FORMAT: FMT351															
THE DETAILED DIFFERENCE LISTING PROVIDES A HISTORY OF THE DETECTED DIFFERENCES (HOLD, PREES, ELISHED, RANDOM, AND SEQUENCE) DURING A SIMULATOR RUN. THE LISTING INDICATES THE TIME, TYPE, AND UP TO THE FIRST THREE ACTUAL DIFFERENCES FOR EACH TEST WHERE A DIFFERENCE IS DETECTED. IF MORE THAN THREE DIFFERENCES ARE DETECTED FOR ONE TEST, THE EXCESS OVER THREE IS NOTED AS AN ADDENDUM (N) OTHERS.																			
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS																
	INITIALIZE SIMULATOR	INITIALIZE PPP I,DISPLAY=2,4,1	INCLUDE REFERENCE SELECTION OR APPROPRIATE PROCEDURES FORMAT PPP TO RUN MODE																
	SIMULATOR TO RUN MODE	I,RUN																	
	SIMULATOR TO HOLD MODE	MONITOR ALL DESIRED PPP REAL-TIME DATA																	
	SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION 3) TERMINATE THIS RUN RECONFIGURE FOR NEXT RUN	I,ENDRT I,DISPLAY=3,5,1 I,DISPLAY=3,1,1 I,DISPLAY=3,2,1 I,DISPLAY=3,3,1 I,TERMINATE	DISCUSS PREVIOUS OR SUB- SEQUENT OPERATIONS TERMINATE PPP REAL-TIME OPERATIONS MONITOR DISPLAY OF DETECTED DIFFERENCES FOR DATA ANALYSIS AND RECONSTRUCT DATA AS REQUIRED MONITOR HOLD DIFFERENCES MONITOR SWITCH DIFFERENCES MONITOR SEQUENCES DIFFERENCES END PPP OPERATIONS																
AVAILABLE DISPLAY AND CONTENT	<div>DETAILED DIFFERENCE SUMMARY</div> <div>R000E002N001C000P00010LM RUN 12/03/74 FMT 351</div> <table><thead><tr><th>GET</th><th>TYPE</th><th>DIFFERENCE</th></tr></thead><tbody><tr><td>16/35</td><td>PRE SEL</td><td>ILS-NEEDLES TPHASE-AUTO L CRT-SAC (1) OTHERS</td></tr><tr><td>17/00</td><td>RANDOM</td><td>RCS +ROLL-ON</td></tr><tr><td>17/10</td><td>HOLD</td><td>RCS +PITCH-ON</td></tr><tr><td>17/22</td><td>SEQ</td><td>RCS +ROLL-OFF RCS +PITCH-OFF ALPHA CONTROL FLT PATH CONT HYERIC PITCH (2) OTHERS</td></tr></tbody></table> <div>← DIFFERENCE TEST START TIME</div> <div>← DIFFERENCE TYPE</div> <div>← DIFFERENCE DETAILS</div> <div>ORIGINAL PAGE IS OF POOR QUALITY</div>				GET	TYPE	DIFFERENCE	16/35	PRE SEL	ILS-NEEDLES TPHASE-AUTO L CRT-SAC (1) OTHERS	17/00	RANDOM	RCS +ROLL-ON	17/10	HOLD	RCS +PITCH-ON	17/22	SEQ	RCS +ROLL-OFF RCS +PITCH-OFF ALPHA CONTROL FLT PATH CONT HYERIC PITCH (2) OTHERS
	GET	TYPE	DIFFERENCE																
16/35	PRE SEL	ILS-NEEDLES TPHASE-AUTO L CRT-SAC (1) OTHERS																	
17/00	RANDOM	RCS +ROLL-ON																	
17/10	HOLD	RCS +PITCH-ON																	
17/22	SEQ	RCS +ROLL-OFF RCS +PITCH-OFF ALPHA CONTROL FLT PATH CONT HYERIC PITCH (2) OTHERS																	

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FIGURE A8

PPP PERFORMANCE EVALUATION CAPABILITY		FORMAT: FMT4xx																																																				
SUMMARY DESCRIPTION	PERFORMANCE EVALUATION CAPABILITY PROVIDES FOR THE AUTOMATIC MONITORING AND DISPLAY UPON USER REQUEST OF THE COMPARISON OF SELECTED SIMULATOR AND CREWMAN PERFORMANCE PARAMETERS WITH ESTABLISHED PERFORMANCE CRITERIA DATA. THE DISPLAYS PROVIDE A DESCRIPTION OF THE PARAMETER BEING MONITORED, ITS CRITERIA VALUE, AND ITS CURRENT VALUE. WHEN PERFORMANCE EXCEEDS THE ESTABLISHED CRITERIA, THE MAXIMUM AND/OR MINIMUM VALUE IS DISPLAYED. ACTUAL VALUES MAY REFLECT ONE-TIME OCCURRENCE (SNAP SHOTS) OR MAX/MIN VALUE EXPERIENCE DURING THE SIMULATION																																																					
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS	PPP OPERATIONS																																																				
	REMARKS																																																					
INITIALIZE SIMULATOR	SIMULATOR TO RUN MODE	INITIALIZE PPP I,DISPLAY=4,1,1 I,RUN																																																				
	SIMULATOR TO HOLD MODE	MONITOR PERFORMANCE EVALUATION DISPLAYS																																																				
	SIMULATOR TO HOLD MODE	I,DISPLAY=4,2,1 I,REPEAT=GET,0/15/10																																																				
	SIMULATOR TO RUN MODE	 I,ENDRT																																																				
	SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION 3) TERMINATE THIS RUN - RECONFIGURE FOR NEXT RUN	I,DISPLAY=4,1,1 I,REPEAT=GET,0/00/5,5 I,↑ I,TERMINATE																																																				
		PPP TO RUN MODE OBSERVE AUTOMATIC ADVANCEMENT TO PROPER MINI-PHASE CONDITION TO MATCH TRAJECTORY STATE MONITOR END-OF-MINI-PHASE DATA DURING HOLD MONITOR MINI-PHASE DATA AT RECONSTRUCTION TIME OBSERVE AUTOMATIC SEQUENCE TO PROPER MINI-PHASE TERMINATE PPP REAL-TIME OPERATIONS MONITOR END-OF-MINI-PHASE DATA MONITOR MINI-PHASE DATA AT RECONSTRUCTION TIME ADVANCE MINI-PHASE DISPLAY 5 SECONDS IN THE FUTURE END PPP OPERATION																																																				
AVAILABLE DISPLAY AND CONTENT	<div>ENTRY FLIGHT PHASE RCASE003R01C0L0PAAMIJDA HOLD 11/07/75 FMT441 GET 0/15/20 ACTUAL GW</div> <div>OTHER USER DEFINED PERFORMANCE DATA</div> <div>DEVIATIONS FROM CRITERION VALUES</div> <div>MAX AND/OR MIN PERFORMANCE VALUES EXPERIENCED DURING RUN</div> <div>USER DEFINED PERFORMANCE CRITERION DATA</div> <div>USER DEFINED PARAMETER LABELS</div> <div>DISPLAY TIME HR/MIN/SEC</div> <table><tr><th>PARAMETER</th><th>CRITERION</th><th>ACTUAL</th><th>DEVIATIONS</th></tr><tr><td>ATT. AT .05G</td><td></td><td></td><td></td></tr><tr><td>ALPHA</td><td>30.4/+3.</td><td>29.</td><td></td></tr><tr><td>BANK</td><td>0.4/+3.</td><td>0.</td><td></td></tr><tr><td>SIDSLIP</td><td>0.4/+2.</td><td>0.</td><td></td></tr><tr><td>MAX G-LOAD</td><td><2.</td><td>13.</td><td>11.</td></tr><tr><td>MAX QDOT</td><td><100.</td><td>96.</td><td></td></tr><tr><td>MAX HEADING</td><td>0.1/-20.</td><td>-7.</td><td>104. 84.</td></tr><tr><td>MAX TEMP</td><td><2300.</td><td></td><td></td></tr><tr><td>RANGE INCHES</td><td>+300. +370.</td><td>302.</td><td></td></tr><tr><td>MAX HDOT</td><td>-700. +200.</td><td>-608.</td><td>108.</td></tr><tr><td>MAX EL HIG M</td><td>0.4/+1000.</td><td></td><td></td></tr><tr><td>MAX BANK ANG</td><td>0.4/+120.</td><td>-107.</td><td>71.</td></tr></table>		PARAMETER	CRITERION	ACTUAL	DEVIATIONS	ATT. AT .05G				ALPHA	30.4/+3.	29.		BANK	0.4/+3.	0.		SIDSLIP	0.4/+2.	0.		MAX G-LOAD	<2.	13.	11.	MAX QDOT	<100.	96.		MAX HEADING	0.1/-20.	-7.	104. 84.	MAX TEMP	<2300.			RANGE INCHES	+300. +370.	302.		MAX HDOT	-700. +200.	-608.	108.	MAX EL HIG M	0.4/+1000.			MAX BANK ANG	0.4/+120.	-107.	71.
PARAMETER	CRITERION	ACTUAL	DEVIATIONS																																																			
ATT. AT .05G																																																						
ALPHA	30.4/+3.	29.																																																				
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FIGURE A9

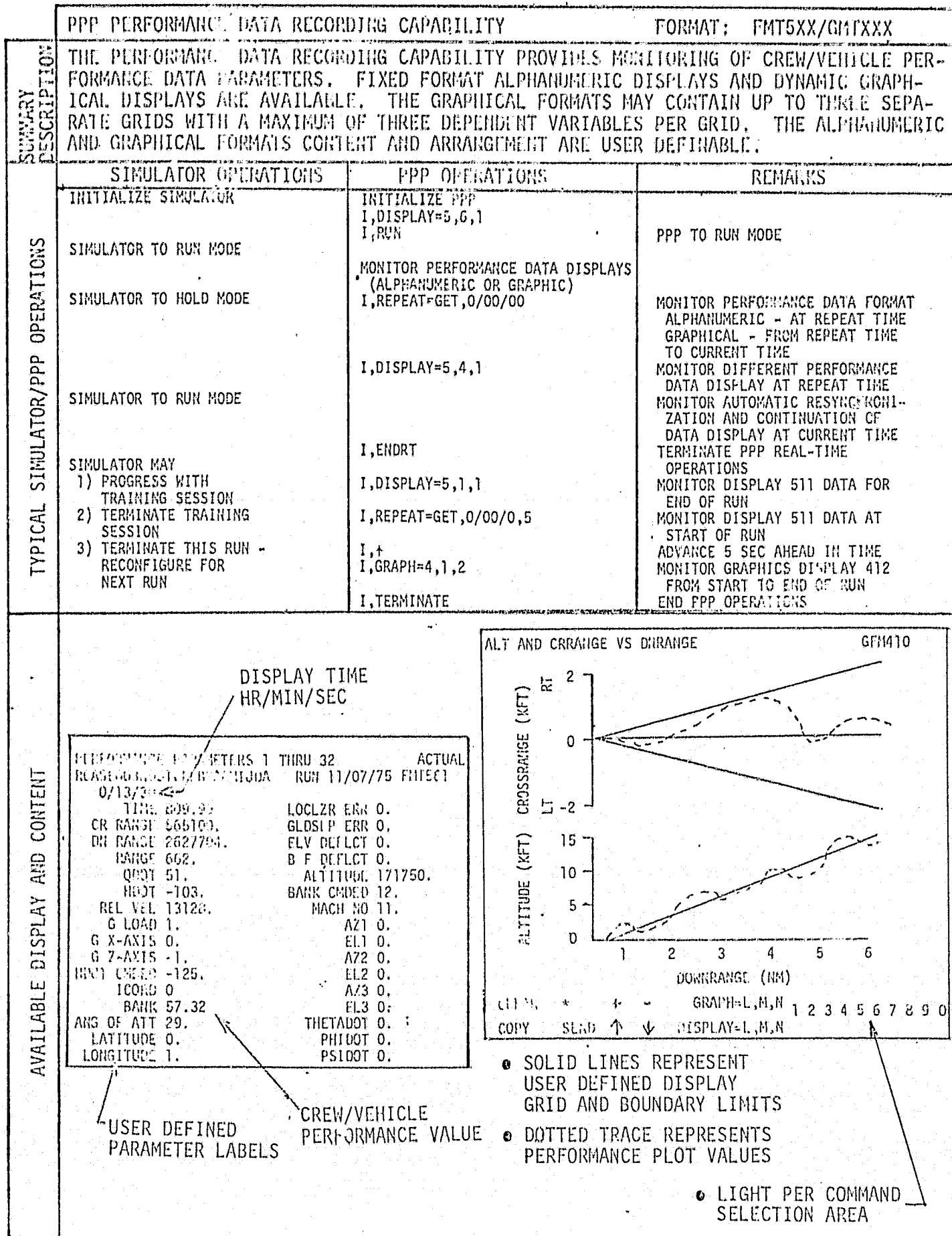


FIGURE A70

THE UNIVERSITY OF CHICAGO

FIGURE A11

PPP CREW TRAINING STATUS CAPABILITY		FORMAT: FMT621
SUMMARY DESCRIPTION	THE CREW TRAINING STATUS CAPABILITY PROVIDES A RECORD OF ALL CREW RELATED SIMULATOR UTILIZATION AS FOLLOWS: 1) ALL EXERCISES CHRONOLOGICALLY, STARTING WITH THE MOST RECENT RUN AND PROGRESSING BACK IN TIME, 2) A SUMMARY OF EACH CREWMAN'S TRAINING ACTIVITIES LISTED BY EXERCISE, 3) A SUMMARY OF EACH CREW'S TRAINING ACTIVITIES LISTED BY MISSION PHASE, AND 4) A SUMMARY OF EACH CREW'S TRAINING ACTIVITIES LISTING THE NUMBER OF EXERCISES COMPLETED.	
	SIMULATOR OPERATIONS	PPP OPERATIONS
TYPICAL SIMULATOR/PPP OPERATIONS	INITIALIZE SIMULATOR	INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN
	SIMULATOR TO RUN MODE	OR APPROPRIATE DISPLAY PPP TO RUN MODE
TYPICAL SIMULATOR/PPP OPERATIONS	TERMINATE SIMULATOR OPERATIONS	MONITOR APPROPRIATE DISPLAYS I,ENDRT I,DISPLAY=7,1,1 I,DISPLAY=7,2,1 I,DISPLAY=6,2,1 I,+ I,DISPLAY=6,2,2 I,XXX I,+ I,DISPLAY=6,2,3 I,YYY I,+ I,DISPLAY=6,2,4 I,ZZZ I,TERMINATE
		TERMINATE PPP REAL-TIME OPERATIONS INPUT TRAINING DATA COMPLETE REQUIRED POST-RUN DATA OBSERVE: LATEST TRAINING INPUT AND ANY PREVIOUS DATA ADVANCE DISPLAY TO OTHER PAST RUN DATA OBSERVE: FIRST DISPLAY PAGE WITH I.D. CODE FOR EACH CREWMAN XXX = CREWMAN CODE OBSERVE: CREWMAN XXX'S DATA ADVANCE DISPLAY TO OTHER PAST RUN DATA OBSERVE: FIRST DISPLAY PAGE WITH I.D. CODE FOR EACH MISSION YYY = CREW CODE OBSERVE: PRIMARY CREW YYY'S DATA ADVANCE DISPLAY TO BACKUP CREW YYY'S DATA OBSERVE: FIRST DISPLAY PAGE WITH I.D. CODE FOR EACH MISSION ZZZ = CREW CODE OBSERVE: CREW ZZZ'S DATA END PPP OPERATIONS OBTAIN HANDCOPY OUTPUT FOR DOCUMENTATION
CONTINUED ON NEXT PAGE		
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PPP CREW TRAINING STATUS CAPABILITY (CONTINUED)

CHRONOLOGICAL HISTORY

DATE	CREWMEN	EXERCISE DESCRIPTION	FMT621 TIME
01/23/75	SPA L	702 EPS MALFUNCTIONS	1/10
	HAW C	102 MODE I, II ABORTS	0/20
	HAW C	102 MODE I, II ABORTS	0/20
01/22/75	ARB P		
	HAW C	301 NOMINAL RENDEZVOUS	4/30
	ARB P		
	BEN M		
	MCG P	602 ECS MALFUNCTIONS	2/45

SIMULATION RUN TIME
OF EXERCISE IN HR/MINDATE OF RUN
(LATEST FIRST)EXERCISE NUMBER AND TITLE
(LATEST EXERCISE OF DAY, FIRST)CREWMEN ID CODE
(INITIALS)CREW POSITION DURING EXERCISE
C = COMMANDER
P = PILOT
M = MISSION SPECIALIST
L = PAYLOAD SPECIALISTORIGINAL PAGE IS
OF POOR QUALITYID CODE (INPUT TO SELECT
CREWMAN'S DATA)

CREWMAN SUMMARY

FMT622

SELECT CREWMAN SUMMARY BY INPUTTING
THE APPROPRIATE NAME CODE

CODE	NAME	CODE	NAME	CODE	NAME
ARB	ARBET				
BEN	BENBOW				
HAW	HAWK				
LEW	LEWIS				
MAG	MANGIARACH				

CREWMAN'S NAME

CREW SUMMARY

FMT622

ARBET	EXERCISE DESCRIPTION	POS	TIME	CC	DATE
	102 MODE I, II ABORTS	P	0/20	0	01/23/75
	102 MODE I, II ABORTS	P	0/20	1	01/23/75
	301 NOMINAL RENDEZVOUS	P	4/30	1	01/22/75

DATE OF RUN

COMPLETION CODE
(1 IF RUN COMPLETED)CREW POSITION
DURING EXERCISEEXERCISE NUMBER & TITLE
(IN NUMERICAL ORDER-LATEST FIRST)SIMULATION RUN TIME
OF EXERCISE IN HR/MIN

CONTINUED ON NEXT PAGE

AVAILABLE DISPLAY AND CONTENT

PPP CREW TRAINING STATUS CAPABILITY (CONTINUED)

ID CODE (INPUT TO SELECT
MISSION'S DATA)

MISSION IDENTIFICATION

CREW TIME SUMMARY

FMT623

SELECT CREW TIME SUMMARY BY INPUTTING
THE APPROPRIATE MISSION CODE

CODE	MISSION	CODE	MISSION	CODE	MISSION
1	ALT CF 8	13	OFT 1	25	
2	ALT CF 9	14	OFT 2	26	

MISSION PHASE ID

TIME SUMMARY

FMT623

ALT CF 9	PRIME CREW				TOTAL
EXERCISES	HAW	ARB	BEN	SPA	
LAUNCH	0/40	0/40			1/20
ORBITAL					
RENDEZ	4/30	4/30	4/30		13/30

TIME SUMMARY

FMT623

ALT CF 9	BACKUP CREW				TOTAL
EXERCISES	LEW	MCG	MAN	PUB	
LAUNCH					
ORBITAL					
RENDEZ					
DEORB/ENT					
TOTAL					

CREWMEN IDENTIFICATION

COMM
ECS
EPS
MECH
TOTAL

2/45

2/45

CUMMULATIVE TIME

2/45

2/45

ID CODE (INPUT TO SELECT
MISSION'S DATA)

MISSION IDENTIFICATION

EXERCISES COMPLETED

FMT624

SELECT CREW EXERCISES COMPLETED BY INPUTTING
THE APPROPRIATE MISSION CODE

CODE	MISSION	CODE	MISSION	CODE	MISSION
1	ALT CF 8	13	OFT 1	25	
2	ALT CF 9	14	OFT 2	26	

EXERCISE NUMBER

EXERCISES COMPLETED

FMT624

ALT CF 9	PRIME CREW				BACKUP CREW			
EXER	HAW	ARB	BEN	SPA	LEW	MCG	MAN	PUB
101								
102	1	1						
103								
201								
301	1	1	1					

CREWMEN IDENTIFICATION

NUMBER OF TIMES
EXERCISE COMPLETED

AVAILABLE DISPLAY AND CONTENT

FIGURE A12

PPP NONCREW TRAINING STATUS CAPABILITY			FORMAT: FMT631	
SUMMARY DESCRIPTION	THE NONCREW TRAINING STATUS CAPABILITY PROVIDES A RECORD OF ALL NONCREW RELATED SIMULATOR UTILIZATION STARTING WITH THE MOST RECENT EXERCISE AND PROGRESSING IN CHRONOLOGICAL ORDER BACK IN TIME.			
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS		PPP OPERATIONS	
	REMARKS			
TYPICAL SIMULATOR/PPP OPERATIONS	INITIALIZE SIMULATOR		INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN	
	SIMULATOR TO RUN MODE		OR APPROPRIATE DISPLAY PPP TO RUN MODE	
TYPICAL SIMULATOR/PPP OPERATIONS	TERMINATE SIMULATOR OPERATIONS		MONITOR APPROPRIATE DISPLAYS I,ENORT	
			TERMINATE PPP REAL-TIME OPERATIONS INPUT TRAINING DATA COMPLETE REQUIRED POST-RUN DATA OBSERVE: LATEST TRAINING INPUT AND ANY PREVIOUS DATA ADVANCE DISPLAY TO OTHER PAST RUN DATA END PPP OPERATIONS OBTAIN HARD COPY OUTPUT FOR DOCUMENTATION	
AVAILABLE DISPLAY AND CONTENT				
	CHRONOLOGICAL HISTORY			
AVAILABLE DISPLAY AND CONTENT	RCASE002N001CRLEBPAAWJDA BATCH 11/18/75 FMT631- 1			
	ACTUAL			
AVAILABLE DISPLAY AND CONTENT	DATE CREWMEN EXERCISE DESCRIPTION TIME			
	11/18/75 VDB C 142 ENTRY RANGE CONTROL 0/24			
AVAILABLE DISPLAY AND CONTENT	11/18/75 KJB P 142 ENTRY RANGE CONTROL 0/24			
	11/18/75 RHT C 200 ASCENT MANUAL TECH 1/14			
AVAILABLE DISPLAY AND CONTENT	11/18/75 GPC P 200 ASCENT MANUAL TECH 1/14			
	11/18/75 REE C 200 ASCENT MANUAL TECH 1/20			
AVAILABLE DISPLAY AND CONTENT	11/18/75 JRL P 200 ASCENT MANUAL TECH 1/20			
	11/13/75 REE C 42 **NO DESCRIPTION AVAIL 1/27			
AVAILABLE DISPLAY AND CONTENT	11/13/75 RHT P 42 **NO DESCRIPTION AVAIL 1/27			
	10/30/75 JRL C 250 ASCENT RTLS ABORT 1/36			
AVAILABLE DISPLAY AND CONTENT	10/24/75 KJB C 250 ASCENT RTLS ABORT 1/30			
	10/24/75 RHT P 250 ASCENT RTLS ABORT 1/30			
AVAILABLE DISPLAY AND CONTENT	10/24/75 RHT P 250 ASCENT RTLS ABORT 1/24			
	10/24/75 GPC P 250 ASCENT RTLS ABORT 1/24			
AVAILABLE DISPLAY AND CONTENT	SIMULATION RUN TIME OF EXERCISE IN HR/MIN			
AVAILABLE DISPLAY AND CONTENT	CREWMEN ID CODE			
	EXERCISE NUMBER AND TITLE			
AVAILABLE DISPLAY AND CONTENT	CREW POSITION DURING EXERCISE			

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FIGURE A13

	PPP SYSTEM UTILIZATION CAPABILITY		FORMAT: FMTG41
SUMMARY DESCRIPTION	THE SYSTEM UTILIZATION CAPABILITY PROVIDES A RECORD OF THE TOTAL CREW AND NONCREW RELATED UTILIZATION OF THE SIMULATOR/PPP SYSTEM.		
TYPICAL SIMULATOR/PPP OPERATIONS	SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
		INITIALIZE PPP I,DISPLAY=6,4,1 I,TERMINATE	REQUIRE INITIALIZATION ONLY MONITOR UTILIZATION DATA END PPP OPERATIONS OBTAIN HARDCOPY OUTPUT FOR DOCUMENTATION
AVAILABLE DISPLAY AND CONTENT	<div><div>SYSTEM UTILIZATION SUMMARY RCASE002N001CRLBPAAM13DA BATCH 11/18/75 FMTG41</div><div>CREW RELATED UTILIZATION 7/36/37 NON-CREW RELATED UTILIZATION 3/09/49 TOTAL SYSTEM UTILIZATION 10/46/26</div></div> <div>UTILIZATION TIME IN HR/MIN/SEC</div> <div>UTILIZATION CATEGORIES</div>		

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FIGURE A14

SUMMARY DESCRIPTION		TYPICAL SIMULATOR/PPP OPERATIONS		AVAILABLE DISPLAY AND CONTENT	
PPP DISPLAY RECONSTRUCTION CAPABILITY		THE DISPLAY RECONSTRUCTION CAPABILITY ALLOWS THE USER, DURING A SIMULATION HOLD OR POST-RUN, TO DISPLAY PAST TIME RUN DATA ON THE APPROPRIATE PROCEDURES, PERFORMANCE, OR EVALUATION DISPLAYS. ALPHANUMERIC FORMATS ARE RECONSTRUCTED AT THE REPEAT TIME AND GRAPHICAL FORMATS ARE RECONSTRUCTED FROM THE REPEAT TIME TO THE CURRENT OR END OF RUN TIME.			
SIMULATOR OPERATIONS		PPP OPERATIONS		REMARKS	
INITIALIZE SIMULATOR		INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN		PPP TO RUN MODE	
SIMULATOR TO RUN MODE		MONITOR PROCEDURES I,REPEAT=GET,0/0/0		MONITOR PAST TIME DATA PROCEDURES AT GET 0/0/0 PERFORMANCE AT GET 0/0/0 GRAPHICAL FROM GET 0/0/0 TO SIMULATION HOLD TIME	
SIMULATOR TO HOLD MODE		I,DISPLAY=5,6,1 I,GRAPH=4,1,0		PROCEDURES AT GET 0/0/0 MONITOR CURRENT TIME DATA TERMINATE PPP REAL-TIME OPERATIONS	
SIMULATOR TO RUN MODE		I,DISPLAY=2,4,1		MONITOR PAST TIME DATA PROCEDURES AT GET 0/15/0 PERFORMANCE AT GET 0/15/0 GRAPHICAL FROM 0/15/0 TO END OF RUN TIME	
SIMULATOR MAY		I,ENDRT		TRAINING SCRIPT AT GET 0/15/0	
1) PROGRESS WITH TRAINING SESSION		I,REPEAT=GET,0/15/0		END PPP OPERATIONS	
2) TERMINATE TRAINING SESSION		I,DISPLAY=5,6,1 I,GRAPH=4,1,0			
3) TERMINATE THIS RUN RECONFIGURE FOR NEXT RUN		I,DISPLAY=6,1,1 I,TERMINATE			
FREEZE KEY		SM SIMULATION DATA		PERFORMANCE PARAMETERS 1 THRU 32	
R00E000HJ0R0C0C0P000I000 RUN 09/19/75 FMT241		ACTUAL		RCASE0000010000PAA0I0DA RUN 11/07/75 FMT241	
ELAPSED TIME		HALF IDENT		C/W ALERT, CRT DISPLAY AND SW/CB PROCEDURE PNL	
0/00/43		SM ALERT-LT-OFF		TIME 809.90	
0/01/10		CABIN TEMP CONT-OFF L2		CR RANGE 865100.	
0/01/15		CABIN FAN 1-ON L1		DY RANGE 2627704.	
0/01/20		C/W CBW FLOW LT-OFF		RANGE 062.	
0/01/20		DISPLAY 0701 E C2L		QDOT 51.	
0/01/31		20701-L		HDOT -103.	
0/01/40		DISPLAY 0711 E C2R		REL VEL 13128.	
0/01/41		20711-R		G LOAD 1.	
0/01/46		KEYBOARD SEL-LEFT C2		X X-AXIS 0.	
0/01/54		DISPLAY 0721 E C2L		G Z-AXIS -1.	
0/01/55		20721-C		HDOT CHGCD -125.	
0/03/09		ACK C2L		ICORD 0	
0/03/10		SM ALERT LT-OFF		BANK 57.32	
ENTRY FLIGHT PHASE		RCASE003R00ICKLEPAA0I0DA HOLD 11/07/75 FMT441		ANG OF ATT 29.	
GET 0/15/20		GW		LATITUDE 0.	
PARAMETER		CRITERION		LONGITUDE 1.	
ATT. AT .05G		ACTUAL		LOCLZR ERR 0.	
ALPHA		30.+/-3.		GLOSIP ERR 0.	
BANK		0.+/-3.		ELV DEFLECT 0.	
SIDESLIP		0.+/-2.		B F DEFLECT 0.	
MAX G-LOAD		<2.		ALTITUDE 171750.	
MAX QDOT		<100.		BANK CHGCD 12.	
MAX HEADING		0.+/-20.		MACH NO 11.	
MAX TEMP		<2300.		AZ1 0.	
RANGE INILES		+300. +370.		EL1 0.	
MAX HDOT		-700. +200.		AZ2 0.	
MAX EL INNG M		0.+/-1000.		EL2 0.	
MAX BANK ANG		0.+/-120.		AZ3 0.	
				EL3 0.	
				THETA DOT 0.	
				PHIDOT 0.	
				PSIDOT 0.	

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FIGURE A15

PPP CUE INSERTION CAPABILITY		
THE CUE INSERTION CAPABILITY ALLOWS THE USER TO AUTOMATICALLY RECORD TIMES, DURING SIMULATION REAL-TIME, ASSOCIATED WITH CRITICAL PHASES, PROBLEM AREAS, OR DESIRABLE DISCUSSION AREAS. THE RECORDED TIMES ARE AVAILABLE DURING SIMULATION HOLDS AND POST-RUN TO FACILITATE DATA RECONSTRUCTION.		
TYPICAL SIMULATOR AND PPP OPERATIONS		
SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
INITIALIZE SIMULATOR	INITIALIZE PPP I,DISPLAY=2,4,1 I,RUN	OR APPROPRIATE DISPLAY PPP TO REAL-TIME
SIMULATOR TO RUN	MONITOR PPP DATA CUE KEY DEPRESS I,DISPLAY=2,4,1 I,ENDRT	SELECT DESIRED DISPLAYS UP TO 30 INPUTS AVAILABLE
SIMULATOR MAY 1) PROGRESS WITH TRAINING SESSION 2) TERMINATE TRAINING SESSION 3) TERMINATE THIS RUN RECONFIGURE FOR NEXT RUN	I,CUE I,2 I,GRAPH=4,1,0 I,TERMINATE	TERMINATE PPP REAL-TIME OPERATIONS DISPLAYS CUE TABLE RECONSTRUCTS DATA AT GET 9/15 (H07241) FROM GET 9/15 TO END OF RUN (GFM 410)
		END PPP OPERATIONS
CUE RECORD SUMMARY TABLE		
R00CE00000100		

GET TIME OF CUE
DISPLAY ACCESS

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FIGURE A16

GDP TO PPP DATA TRANSFER CAPABILITY

THE GDP TO PPP DATA TRANSFER CAPABILITY ALLOWS THE USER TO ACCESS FLIGHT DATA FILE PROCEDURES DATA STORED ON THE GDP AND TRANSFER THE DATA VIA MAGNETIC TAPE TO THE PPP.

SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
INITIALIZE SIMULATOR	REQUEST "STORE" TAPE FROM GDP PERSONNEL SUBMIT TAPE AND PROGRAM "CRIS"	IDENTIFY REQUIRED DOCUMENT GENERATES STANDARD CODE400 TAPE ENABLES CREATION OF NEW REFERENCE FILE GENERATES NEW FILE
SIMULATOR TO RUN MODE	SUBMIT PROGRAMS "GDPSTRT" AND "GDPLEXC" PROCESS DATA PER TUTORIAL DISPLAY TERMINATE "GDPLEXC" SUBMIT PROGRAM "CREF"	PERMANENTLY STORES DATA AS REFERENCE DATA INCLUDE REFERENCE SELECTION PPP TO RUN
TERMINATE SIMULATION	INITIALIZE PPP I, DISPLAY=2,4,1 I, RUN MONITOR PPP DATA DISPLAY I, DISPLAY=3,3,1 I, ENDRT I, DISPLAY=2,4,1 I, / I, TERMINATE	IF DIFFERENCE EXISTS OBSERVE FLASHING MESSAGE OR APPROPRIATE DISPLAY REVIEW REFERENCE DATA END PPP OPERATIONS

REFERENCE IDENTIFICATION

DETAILED PROCEDURES TIMELINE				REFERENCE
RCASE002NCC10RL8PAAMTJDA	RUN	05/06/76	FMT211	
GET LT	OPERATIONS			
0717	H20 RYP CONT PRT-OUT	L4		
	H20 RYP CONT PRT-IN	L4		
	H20 RYP CONT SEC-OUT	L4		
	H20 RYP CONT SEC-IN	L4		
	PRN PUMP LF 1-OFF	L1		
	H20 PUMP SEC-OFF	L1		
	H20 PUMP SEC-ON	L1		
	H20 BYPASS PRT-MAN	L1		
	H20 BYPASS PRT-OFF	L1		
	H20 BYPASS PRT-AUTO	L1		
	H20 BYPASS PRT-THOP	L1		

REFERENCE PROCEDURES DATA

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FIGURE A17

PPP TO GDP DATA TRANSFER CAPABILITY

THE PPP TO GDP DATA TRANSFER CAPABILITY ALLOWS THE USER TO TRANSFER ALL OR ANY PART OF THE PPP SIMULATION DATA TO THE GDP. EDITING, FINALIZATION AND FORMAL DOCUMENTATION PROCESSES ARE PERFORMED PER GDP SYSTEM OPERATIONS.

FUNCTIONS

TYPICAL SIMULATOR/PPP OPERATIONS

AVAILABLE DISPLAY AND CONTENT

SIMULATOR OPERATIONS

PPP OPERATIONS

FUNCTIONS

INITIALIZE SIMULATOR

INITIALIZE PPP
I,DISPLAY-2,4,1
I,RUN

OR APPROPRIATE DISPLAY
PPP TO RUN MODE

SIMULATOR TO RUN MODE

I,COPY-GDP

IDENTIFIES START OF DATA TO BE
TRANSFERRED TO GDP

COMPLETE EXERCISE
I,COPY-GDP

IDENTIFIES END OF DATA TO BE
TRANSFERRED TO GDP

TERMINATE SIMULATION

I,ENDRT
I,TERMINATE
SUBMIT"RTITIT"
TRANSFER TAPE TO GDP
PERSONNEL
CALL UP DATA ON GDP SYSTEM

END PPP OPERATIONS
COPIES DATA TO ECONOMIC TAPE

REMAINING OPERATIONS PER GDP
SYSTEM

ANY PROCEDURES, DIFFERENCE PROCEDURES, PERFORMANCE,
PERFORMANCE EVALUATION, OR TRAINING FORMAT DISPLAY
MAY BE TRANSFERRED TO THE GDP SYSTEM.

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FIGURE A18

SYSTEM TO PPP DATA TRANSFER CAPABILITY

THE SYSTEM TO PPP DATA TRANSFER CAPABILITY ALLOWS THE USER TO GENERATE AN INITIAL PROCEDURES TIMELINE FROM SVDS DATA.

SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
	<p>HAVE SVDS RUN AND REQUEST TAPE OUTPUT SUBMIT TAPE AND PROGRAM "PERCON"</p> <p>INITIALIZE PPP USING SIMULATED REAL-TIME OPTION I,DISPLAY=2,2,1 I,END COMPLETE DATA RUN I,ENDRT INPUT REQUEST FOR LINEPRINTER AND MAGNETIC TAPE HARDCOPY I, TERMINATE</p>	<p>GENERATES STANDARD CUC6400 TAPE</p> <p>PPP TO RUN MODE</p> <p>PROVIDES DATA FOR ANALYSIS AND INITIAL PROCEDURES TIMELINE END PPP OPERATIONS</p>

TYPICAL SIMULATOR PPP OPERATIONS

AVAILABLE DISPLAY AND CONTENT

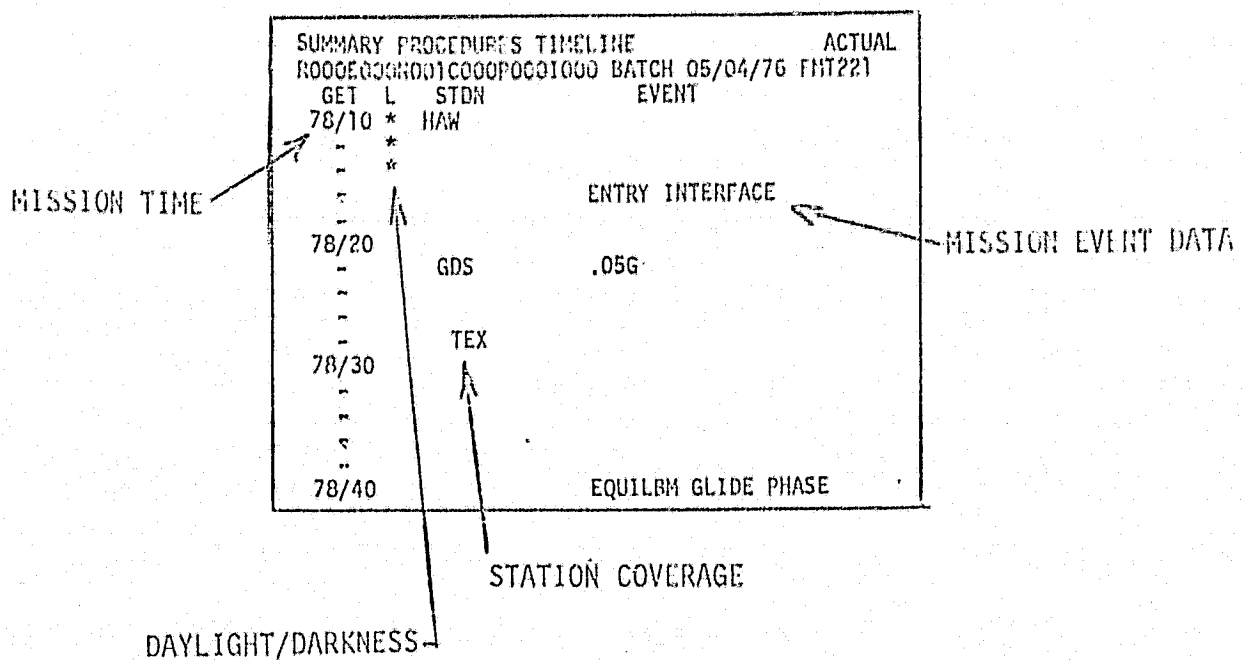


FIGURE A19

PPP FLIGHT DISPLAY UNIT

THE PPP FLIGHT DISPLAY UNIT ALLOWS THE USER TO MONITOR THE SIMULATOR CREW STATION FLIGHT CRT DISPLAY ACTIVITIES.

TYPICAL SIMULATOR/PPP OPERATIONS

SIMULATOR OPERATIONS	PPP OPERATIONS	REMARKS
INITIALIZE SIMULATOR	INITIALIZE PPP	PPP TO RUN MODE
SIMULATOR TO RUN MODE	1, RUN	
ENTER THE FOLLOWING:		
LEFT C/S KEYBOARD		
DISPLAY 701 ENTER	PPP ROTARY-LEFT CRT	MONITOR C/S DISPLAY 701
RIGHT C/S KEYBOARD		
DISPLAY 711 ENTER	PPP ROTARY-RIGHT CRT	MONITOR C/S DISPLAY 711
	1, ENDRT	
TERMINATE SIMULATION	1, TERMINATE	END PPP OPERATIONS

AVAILABLE DISPLAY AND CONTENT

ANY FLIGHT CRT DISPLAY ACTIVE IN
THE SIMULATOR IS AVAILABLE ON THE
PPP FLIGHT DISPLAY UNIT.

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